

What is claimed is:

1. A process for making an olefin product from an oxygenate feed, the process comprising the steps of:
 - a) contacting a metalloaluminophosphate molecular sieve having a porous framework structure with a C₂-C₄ aldehyde composition in a pretreatment zone to form an integrated hydrocarbon co-catalyst within the porous framework; and
 - b) contacting the metalloaluminophosphate molecular sieve containing the integrated hydrocarbon co-catalyst with an oxygenate in an oxygenate conversion zone to convert the oxygenate to olefin product.
2. The process of claim 1, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 2 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.
3. The process of claim 2, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 1.5 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.
4. The process of claim 3, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 1 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.
5. The process of claim 4, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 0.5 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.

6. The process of claim 1, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst in the oxygenate removal zone has a hydrocarbon content of at least 0.1 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

7. The process of claim 6, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst in the oxygenate removal zone has a hydrocarbon content of at least 1 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

8. The process of claim 7, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst in the oxygenate removal zone has a hydrocarbon content of at least 5 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

9. The process of claim 1, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at a temperature that is lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

10. The process of claim 9, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at temperature that is at least 10°C lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

11. The process of claim 10, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at temperature that is at least 25°C lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

12. The process of claim 11, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at temperature that is

at least 50°C lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

13. The process of claim 1, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at a WHSV that is lower than that at which the molecular sieve of step b) contacts the oxygenate.

14. The process of claim 13, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at WHSV that is at least 5 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

15. The process of claim 14, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at WHSV that is at least 10 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

16. The process of claim 15, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at WHSV that is at least 15 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

17. The process of claim 1, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at an aldehyde to molecular sieve weight ratio of from 0.01:1 to 3:1.

18. The process of claim 17, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at an aldehyde to molecular sieve weight ratio of from 0.05:1 to 2:1.

19. The process of claim 18, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at an aldehyde to molecular sieve weight ratio of from 0.1:1 to 1:1.

20. The process of claim 1, wherein the metallocaluminophosphate molecular sieve is silicoaluminophosphate molecular sieve.

21. The process of claim 1, wherein the metallocaluminophosphate molecular sieve is selected from the group consisting of SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AlPO-5, AlPO-11, AlPO-18, AlPO-31, AlPO-34, AlPO-36, AlPO-37, AlPO-46, metal containing molecular sieves thereof, and combinations thereof.

22. The process of claim 1, wherein the aldehyde composition contacting the molecular sieve in the pretreatment zone comprises less than 50 wt % aldehyde, based on total weight of the composition.

23. The process of claim 22, wherein the aldehyde composition contacting the molecular sieve in the pretreatment zone comprises from 0.5 wt % to 45 wt % aldehyde, based on total weight of the composition.

24. The process of claim 1, wherein the aldehyde composition contains acetaldehyde, propionaldehyde, butyraldehyde, or a combination thereof.

25. The process of claim 1, wherein the contact of the molecular sieve of step b) with the oxygenate in the oxygenate conversion zone converts less than 100% of the oxygenate to olefin product.

26. The process of claim 1, wherein at least one olefin in the olefin product is contacted with a polyolefin forming catalyst to form polyolefin.

27. A process for making an olefin product from an oxygenate feed, the process comprising the steps of:

- a) contacting a silicoaluminophosphate molecular sieve with a C₂-C₄ aldehyde composition to form an integrated hydrocarbon co-catalyst within the porous framework; and
- b) contacting the silicoaluminophosphate molecular sieve containing the integrated hydrocarbon co-catalyst with an oxygenate at an aldehyde to molecular sieve weight ratio of from 0.01:1 to 3:1 to convert the oxygenate to olefin product.

28. The process of claim 27, wherein the molecular sieve of step a) contacts the aldehyde composition at an aldehyde to molecular sieve weight ratio of from 0.05:1 to 2:1.

29. The process of claim 28, wherein the molecular sieve of step a) contacts the aldehyde composition at an aldehyde to molecular sieve weight ratio of from 0.1:1 to 1:1.

30. The process of claim 27, wherein the molecular sieve contacting the aldehyde has a carbon content of not greater than 2 wt %, based on total weight of the molecular sieve. prior to contact with the aldehyde.

31. The process of claim 30, wherein the molecular sieve contacting the aldehyde has a carbon content of not greater than 1.5 wt %, based on total weight of the molecular sieve. prior to contact with the aldehyde.

32. The process of claim 31, wherein the molecular sieve contacting the aldehyde has a carbon content of not greater than 1 wt %, based on total weight of the molecular sieve. prior to contact with the aldehyde.

33. The process of claim 27, wherein the molecular sieve contacting the aldehyde has a carbon content of not greater than 0.5 wt %, based on total weight of the molecular sieve, prior to contact with the aldehyde.

34. The process of claim 27, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst has a hydrocarbon content of at least 0.1 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

35. The process of claim 34, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst has a hydrocarbon content of at least 1 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

36. The process of claim 35, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst has a hydrocarbon content of at least 5 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

37. The process of claim 27, wherein the molecular sieve of step a) contacts the aldehyde composition at a temperature that is lower than that at which the molecular sieve of step b) contacts the oxygenate.

38. The process of claim 37, wherein the molecular sieve of step a) contacts the aldehyde composition at temperature that is at least 10°C lower than that at which the molecular sieve of step b) contacts the oxygenate.

39. The process of claim 38, wherein the molecular sieve of step a) contacts the aldehyde composition at temperature that is at least 25°C lower than that at which the molecular sieve of step b) contacts the oxygenate.

40. The process of claim 39, wherein the molecular sieve of step a) contacts the aldehyde composition at temperature that is at least 50°C lower than that at which the molecular sieve of step b) contacts the oxygenate.

41. The process of claim 27, wherein the molecular sieve of step a) contacts the aldehyde composition at a WHSV that is lower than that at which the molecular sieve of step b) contacts the oxygenate.

42. The process of claim 41, wherein the molecular sieve of step a) contacts the aldehyde composition at WHSV that is at least 5 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

43. The process of claim 42, wherein the molecular sieve of step a) contacts the aldehyde composition at WHSV that is at least 10 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

44. The process of claim 43, wherein the molecular sieve of step a) contacts the aldehyde composition at WHSV that is at least 15 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

45. The process of claim 27, wherein the metallaluminophosphate molecular sieve is selected from the group consisting of SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AlPO-5, AlPO-11, AlPO-18, AlPO-31, AlPO-34, AlPO-36, AlPO-37, AlPO-46, metal containing molecular sieves thereof, and combinations thereof.

46. The process of claim 27, wherein the aldehyde composition contacting the molecular sieve comprises less than 50 wt % aldehyde, based on total weight of the composition.

47. The process of claim 46, wherein the aldehyde composition contacting the molecular sieve comprises from 0.5 wt % to 45 wt % aldehyde, based on total weight of the composition.

48. The process of claim 27, wherein the aldehyde composition contains acetaldehyde, propionaldehyde, butyraldehyde, or a combination thereof.

49. The process of claim 27, wherein the contact of the molecular sieve of step b) with the oxygenate converts less than 100% of the oxygenate to olefin product.

50. The process of claim 27, wherein at least one olefin in the olefin product is contacted with a polyolefin forming catalyst to form polyolefin.

51. A process for making an olefin product and polyolefin from an oxygenate feed, the process comprising the steps of:

- a) contacting a metalloaluminophosphate molecular sieve having a porous framework structure with a C₂-C₄ aldehyde composition in a pretreatment zone to form an integrated hydrocarbon co-catalyst within the porous framework;
- b) contacting the metalloaluminophosphate molecular sieve containing the integrated hydrocarbon co-catalyst with an oxygenate in an oxygenate conversion zone to convert the oxygenate to olefin product; and
- c) contacting at least one olefin in the olefin product with a polyolefin forming catalyst to form polyolefin.

52. The process of claim 51, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 2 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.

53. The process of claim 52, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not

greater than 1.5 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.

54. The process of claim 53, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 1 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.

55. The process of claim 54, wherein the molecular sieve contacting the aldehyde composition in a pretreatment zone has a carbon content of not greater than 0.5 wt %, based on total weight of the molecular sieve prior to contact with the aldehyde.

56. The process of claim 51, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst in the oxygenate removal zone has a hydrocarbon content of at least 0.1 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

57. The process of claim 56, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst in the oxygenate removal zone has a hydrocarbon content of at least 1 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

58. The process of claim 57, wherein the molecular sieve containing the integrated hydrocarbon co-catalyst in the oxygenate removal zone has a hydrocarbon content of at least 5 wt %, based on total weight of the molecular sieve, prior to contacting the oxygenate.

59. The process of claim 51, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at a temperature that is lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

60. The process of claim 59, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at temperature that is at least 10°C lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

61. The process of claim 60, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at temperature that is at least 25°C lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

62. The process of claim 61, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at temperature that is at least 50°C lower than that at which the molecular sieve of step b) contacts the oxygenate in the oxygenate removal zone.

63. The process of claim 51, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at a WHSV that is lower than that at which the molecular sieve of step b) contacts the oxygenate.

64. The process of claim 63, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at WHSV that is at least 5 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

65. The process of claim 64, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at WHSV that is at least 10 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

66. The process of claim 65, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at WHSV that is at

least 15 hr⁻¹ lower than that at which the molecular sieve of step b) contacts the oxygenate.

67. The process of claim 51, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at an aldehyde to molecular sieve weight ratio of from 0.01:1 to 3:1.

68. The process of claim 67, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at an aldehyde to molecular sieve weight ratio of from 0.05:1 to 2:1.

69. The process of claim 68, wherein the molecular sieve of step a) contacts the aldehyde composition in the pretreatment zone at an aldehyde to molecular sieve weight ratio of from 0.1:1 to 1:1.

70. The process of claim 51, wherein the metallocaluminophosphate molecular sieve is silicoaluminophosphate molecular sieve.

71. The process of claim 51, wherein the metallaluminophosphate molecular sieve is selected from the group consisting of SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AlPO-5, AlPO-11, AlPO-18, AlPO-31, AlPO-34, AlPO-36, AlPO-37, AlPO-46, metal containing molecular sieves thereof, and combinations thereof.

72. The process of claim 51, wherein the aldehyde composition contacting the molecular sieve in the pretreatment zone comprises less than 50 wt % aldehyde, based on total weight of the composition.

73. The process of claim 72, wherein the aldehyde composition contacting the molecular sieve in the pretreatment zone comprises from 0.5 wt % to 45 wt % aldehyde, based on total weight of the composition.

74. The process of claim 51, wherein the aldehyde composition contains acetaldehyde, propionaldehyde, butyraldehyde, or a combination thereof.

75. The process of claim 51, wherein the contact of the molecular sieve of step b) with the oxygenate in the oxygenate conversion zone converts less than 100% of the oxygenate to olefin product.